

Brian W. Bush

Energy & Infrastructure Analysis Group
Decision Applications Division
Los Alamos National Laboratory
Los Alamos, NM 87545

505-667-6485 (voice)
505-665-5125 (fax)
bwb@lanl.gov (e-mail)
<http://home.lanl.gov/bwb/> (www)

Mission

To research and develop high-quality, integrated analyses and analysis techniques for problems important to society through scientific computing, computational physics, and the modeling & simulation of complex systems.

———— *Skills* ————

Project Leadership

Successfully led software-intensive research & development teams of approximately one dozen people. Experience writing proposals for the NSF, DOE, DOD, and DHS.

Research

Broad and innovative research, analysis, modeling, and simulation experience with complex systems and in disciplines ranging from transportation research to graph theory.
Data mining, statistical learning, and visualization expertise with massive data sets.
Strong theoretical physics basic research background in nuclear structure, involving both analytic and numerical work.

Computing

Extensive scientific computing abilities (particularly simulation architecture, design, and implementation) and numerical methods/algorithms knowledge.
Comprehensive experience with object-oriented software engineering: analysis, architecture, design, coding, testing; Booch methodology and UML.
Design and development expertise with system architectures, frameworks/patterns/libraries/wrappers, data structures, and algorithms.
Languages: active use of C++ (1991–present), Java (1996–present), SQL (1992–present), XML/XSL (1998–present); familiarity with Prolog (1993–present), Haskell (2002–present); past use of Eiffel (1994–1997), FORTRAN (1979–1991), Pascal (1980–1985), PL/I (1982), POSTSCRIPT (1990–1992), SGML/DSSSL (1996–2001), Smalltalk (1993–1996), VRML (1996–2001).
Operating Systems: active use of UNIX (1990–present), Linux clusters (1998–present), Windows NT/2000/XP (1994–present), Windows (1992–1995); past use of VMS, Unicos, MS-DOS.
Software: databases—MySQL, Oracle, dBase, Paradox; geographic information systems—ArcView, MapInfo, Smallworld; class libraries—STL, MPI, PVM, OpenMap, Boost, Booch Components, DBtools.h++, Tools.h++, OWL; mathematics/statistics/visualization—Mathematica, S-PLUS, IDL, HDF, XGobi, Java3D; software engineering—SourceForge, Rational Rose, Together; configuration management—ClearCase, CVS, TeamWare, RCS, SCCS; simulation—DaSSF, Vensim.
Application Areas: discrete-event and continuous simulation; graph and network analysis; mathematical and statistical modeling; data analysis, mining, and visualization.

———— *Experience & Accomplishments* ————

Technical Staff Member, 1993–present

Los Alamos National Laboratory, Los Alamos, NM

Led numerous innovative research-oriented simulation projects (often several simultaneously) with teams of approximately one dozen people and with an emphasis on robust architecture and software quality. Collaborated as a software architect, designer, and programmer on TRANSIMS, a multiyear, multimillion-dollar project to develop a transportation simulation system; led team for information and data handling research and development. Performed ground-breaking research on information theory, graph theory, and infrastructure (electric power, control communications, interdependence) assurance; architected, designed, and developed simulation software, analysis software applications, geographic information systems, and relational databases.

Director-Funded Postdoctoral Fellow, 1990–1992

Los Alamos National Laboratory, Los Alamos, NM

Developed theory and computer simulations of ultrarelativistic heavy-ion collisions, nuclear dissipation, shape diffusion, and level densities, and solvable nuclear models.

Research Associate, 1987–92 (consultant), and Research Assistant, 1984–87

Pacific-Sierra Research Corporation, W. Los Angeles, CA

Analyzed and developed computer simulations of large area urban fires, wildland fires, ignition phenomena; made major contributions to the understanding of wide-scale atmospheric and environmental impacts of nuclear weapons; advised on conduct of radioactive cloud study.

Research Assistant, 1988–90, and National Science Foundation Graduate Fellow, 1985–88

Yale University, New Haven, CT

Researched nuclear shape fluctuations, phase transitions, giant resonances, and Landau theory in hot rotating nuclei, comparing numerically computed predictions to available experimental data; investigated the shell model, level densities, nuclear damping, and pion-proton scattering.

———— **Education** ————

Ph.D. in Theoretical Physics, December 1990

Yale University, New Haven, CT

B.S. in Physics (with honor), June 1985

California Institute of Technology, Pasadena, CA

Continuing Education

Subject Areas: statistics, graph theory, fuzzy logic, information theory, genetic algorithms, neural networks, data mining; visualization; object-oriented analysis and design, data structures, algorithms, patterns, ontologies, effective user interface design, software testing and quality assurance, software engineering process; project leadership.

———— **Activities** ————

Publication

Total of 107 publications (cited over 487 times), including 25 in refereed journals such as *Science*, *Physical Review Letters*, and *Fuzzy Sets & Systems*, 12 in conference proceedings, one patent disclosure, and 69 technical reports. Software packages written in C++, Java, and Smalltalk.

Public Speaking

Speaker 12 times at scientific conferences/workshops and 51 times in seminar series; participant at four other scientific and engineering conferences.